MSV
Mobile Satellite Ventures LP

Answers to FCC's Questions Dated May 5, 2006

FCC File # 0165-EX-ST-2006
May 31, 2006

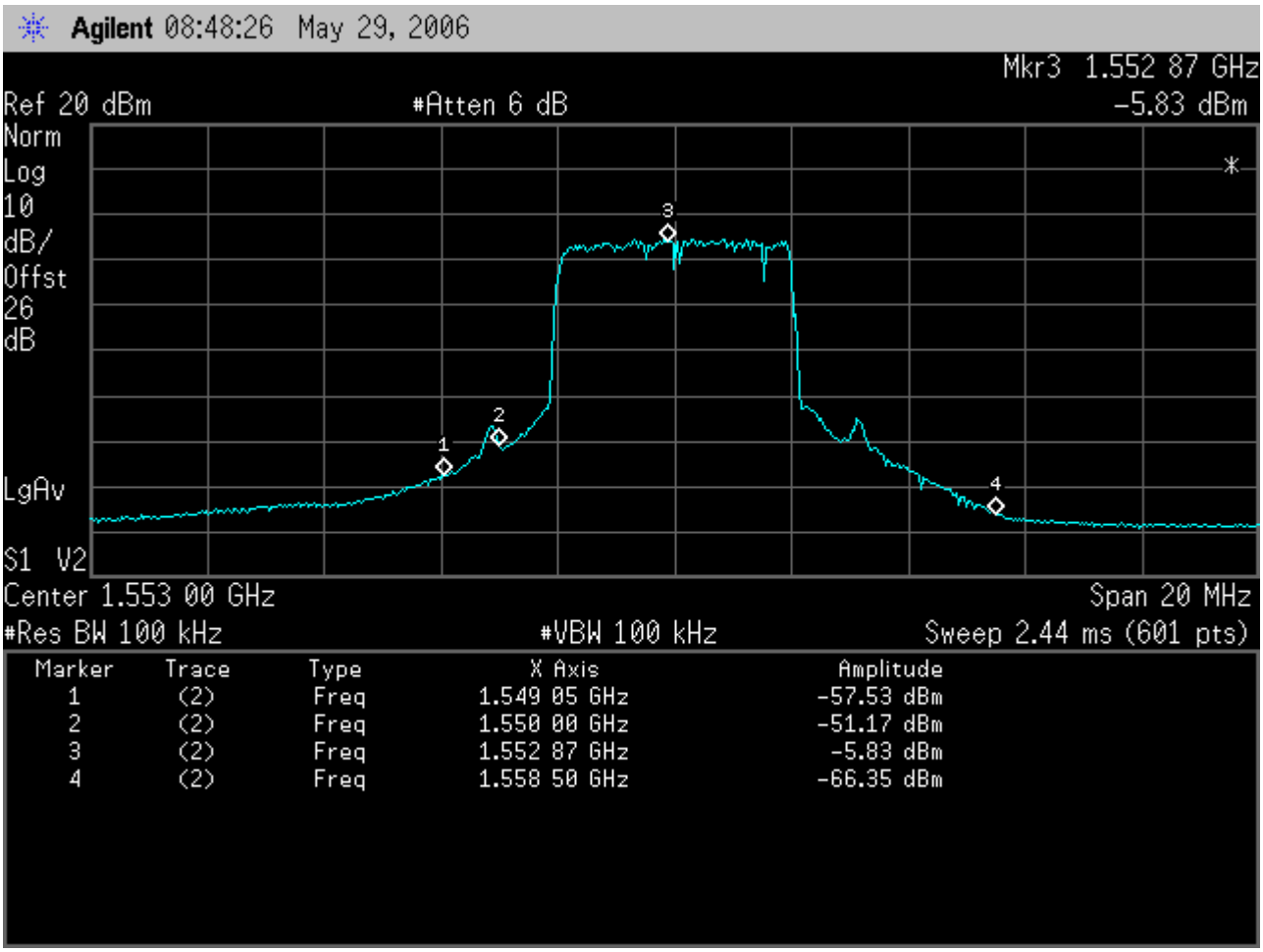
Question 1. Measured out-of-channel and out-of-band emissions data on its base station and customer premises equipment transmitters, including the frequencies of the second and third harmonics of the carrier frequency

The following figure and tables provide measurement data for out-of-channel emissions (OOCE) and out-of-band emissions (OOBE) and subsequent analyses of OOCE and OOBE for the BTS and CPE.

Figure 1 provides measurement data for the carrier spectrum mask, centered at 1553.00 MHz, at the output of the L-band Radio which is used for both BTS and CPE. The carrier bandwidth is 4.375 MHz. Therefore, the lower and upper edge of the carrier is at 1550.81 MHz and 1555.19 MHz, respectively.[1] For the BTS, in order to achieve higher data throughput while maintaining an adequate link margin for the downlink (BTS to CPE), the Radio output will be further amplified by a power amplifier (see Appendix 1 for PA specifications). Please note that the PA will be operating with an 8-10 dB back-off from the P1dB power level. Finally, to ensure that OOCE and OOBE requirements are met, a cavity filter is installed between the output of the PA and the input of the antenna (see Appendix 2 for cavity filter specifications). Please note that the measurements show the center marker at 1552.87MHz, instead of 1553.00MHz, as the latter is the DC tone and its amplitude is not indicative of traffic tones.

[1] On this day, MSV has filed an amendment to its pending application to modify slightly its center frequency. The center frequency and frequency range listed in the original application were incorrectly specified due to miscommunication with the equipment manufacturer.

Figure 1: Carrier Spectrum Mask Measurements



BTS OOCE Analysis

The following table provides analysis of OOCE from trial BTS into adjacent MSS L-band.

Analysis of OOCE from BTS into Adjacent Band			
Parameter	**Trial**	**Units**	**Remarks**
Transmit Frequency	1553.0	MHz	
Number of BTS	1		
BTS PA Output Power	10	dBW	
BTS Tx Bandwidth	4.375	MHz	
Transmission loss	-2.0	dB	
BTS Tx PSD (at antenna input)	1.6	dBW/MHz	
Activation Loss	-1.25	dB	TDD 3:1
OOCE Rejection	-45.3	dBc	@ 1550.00MHz
Additional Filter	-25.0	dB	@ 1550.00MHz
Effective BTS OOCE power density	-70.0	dBW/MHz	
OOCE Limit for L-band BTS (47 C.F.R. § 25.253(b))	-57.9	dBW/MHz	
Margin	12.1	dB	

CPE OOCE Analysis

The following table provides analysis of OOCE from trial CPE into adjacent MSS L-band.

Analysis of OOCE from CPE into Adjacent Band			
Parameter	**Trial**	**Units**	**Remarks**
Transmit Frequency	1553.0	MHz	
Number of CPEs	10		
CPE PA Output	-12	dBW	
CPE Tx Antenna Gain	12	dBi	
CPE Transmit EIRP	0	dBW	
CPE Tx Bandwidth	4.375	MHz	
CPE Tx PSD	-6.4	dBW/MHz	
Activation loss	-16.02	dB	TDD 3:1; 10 CPEs in TDMA
OOCE Rejection	-45.3	dBc	@ 1550.00MHz
Effective CPE OOCE EIRP density	-67.8	dBW/MHz	
OOBE Limit for Broadband PCS (47 C.F.R. § 24.238(a))	-43	dBW/MHz	
Margin	24.8	dB	

BTS OOBE Analysis into GPS

The following table provides analysis of OOBE from trial BTS into GPS band.

Analysis of OOBE from BTS into GPS			
Parameter	**Trial**	**Units**	**Remarks**
Transmit Frequency	1553.0	MHz	
Number of BTS	1		
BTS PA Output Power	10	dBW	
Transmission loss	-2	dB	
BTS Tx Antenna Gain	16	dBi	
BTS Transmit EIRP	24	dBW	
BTS Tx Bandwidth	4.375	MHz	
BTS Tx PSD	17.6	dBW/MHz	
Activation Loss	0.00	dB	
OOBE Rejection in GPS band@1558.5MHz	-60.5	dBc	
Additional Filter	-60.0	dB	
Effective BTS OOBE EIRP density	-102.9	dBW/MHz	
OOBE Limit for L-band BTS and User Terminals (47 C.F.R. § 25.253(c)(9), (g)(3))	-70.0	dBW/MHz	
Margin	32.9	dB	

CPE OOBE into GPS

The following table provides OOBE from trial CPE into GPS band.

Analysis of OOBE from CPE into GPS			
Parameter	**Trial**	**Units**	**Remarks**
Transmit Frequency	1553.0	MHz	
Number of CPEs	10		
CPE PA Output Power	-12	dBW	
CPE Tx Antenna Gain	12	dBi	
CPE Transmit EIRP	0	dBW	
CPE Tx Bandwidth	4.375	MHz	
CPE Tx PSD	-6.4	dBW/MHz	
Activation loss	-12.04	dB	TDD 3:1; 10 CPEs in TDMA
OOBE Rejection in GPS band@1558.5MHz	-60.5	dBc	
Effective CPE OOBE EIRP density	-79.0	dBW/MHz	
OOBE Limit for L-band BTS and User Terminals (47 C.F.R. § 25.253(c)(9), (g)(3))	-70	dBW/MHz	
Margin	9.0	dB	

Regarding the second and third harmonics power density, measurement data in Figure 1 show that the power density of the second and third harmonics of the carrier are at a noise level of approximately -106.00 dBW/MHz.

Question 2. Indicate the latitude/longitude/elevation coordinates of its base station transmitting antenna and the azimuth of the peak of the main lobe of the base station antenna

The specifics of the BTS are:

- Coordinates:
  - Latitude: 38 deg 56 min 44 sec N
  - Longitude: 77 deg 18 min 58 sec W
- Elevation: 367 ft AMSL
- Antenna radiation center: ~90 ft AGL
- Azimuth of peak antenna gain: 200 deg. TN
- Address:
  10780-10790 Parkridge Blvd
  Reston, VA 10191

Question 3. Clarify its base station transmitting antenna pattern with regard to beamwidth in the vertical and horizontal planes.

The BTS antenna specifications are:

- Peak gain: 16 dBi
- Vertical beamwidth: 7 degrees
- Horizontal beamwidth: 63 degrees
- Tx Polarization: Left hand circular

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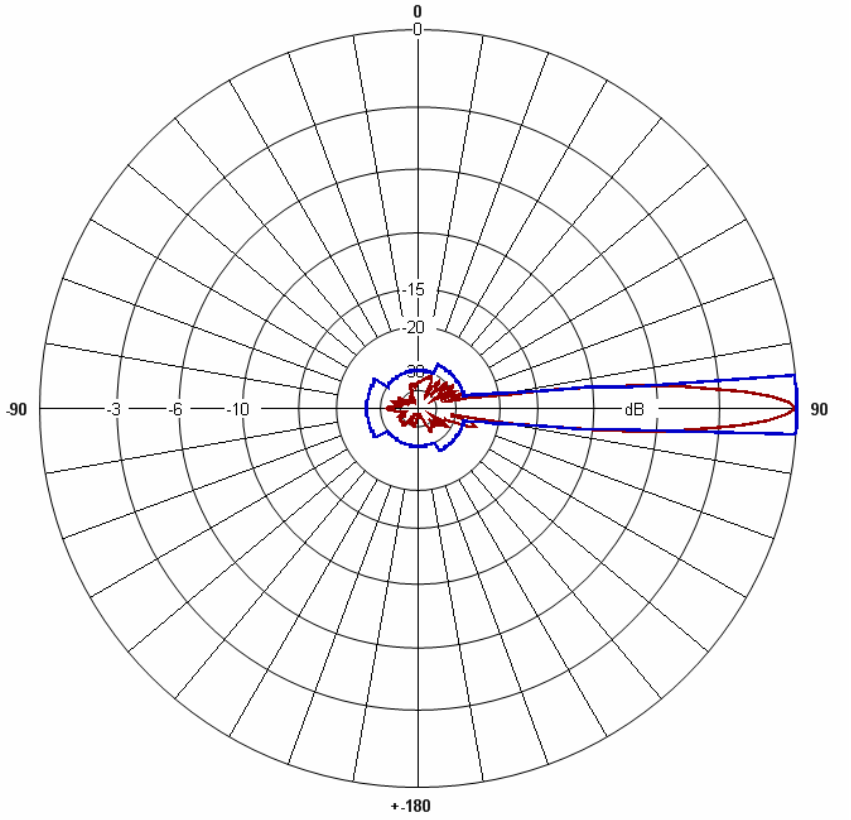
Normalized to -37.6 dB

Centre	Lobe Width	dB
90	7.6	0
106.9	5.8	-23.8

Min = -53.86 dB
Ave = -16.46 dB
SDev = 45.74 dB

Centre	Arc Max Width	dB
0.0	30	-31.16
90.0	30	0
180.0	30	-34.89
-90.0	30	-32.17

Plot ID: Range 2-22-2006 / 9:30 AM



Question 4. Provide the maximum EIRP of its customer premise equipment transmitters.

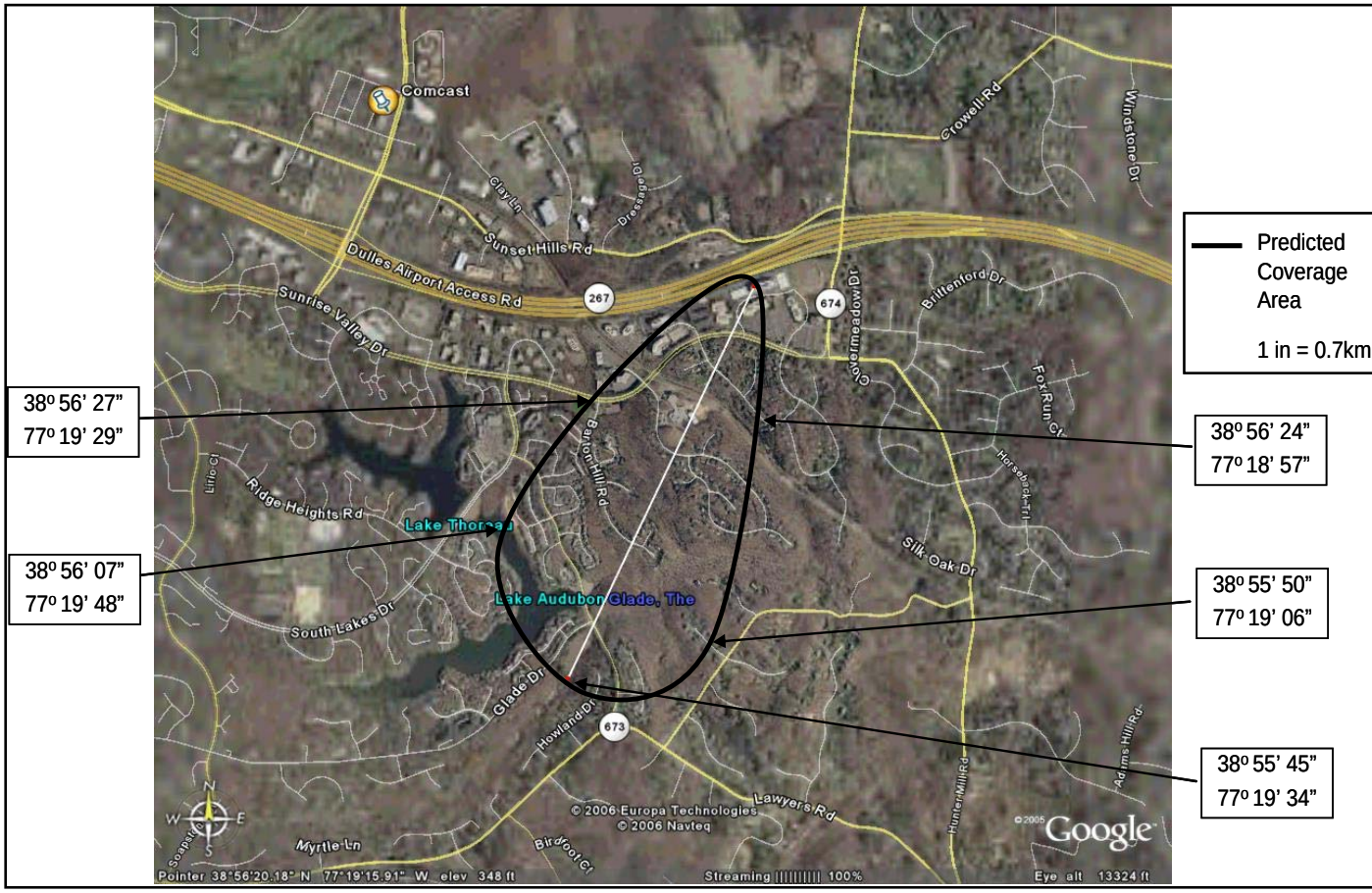
The maximum EIRP of the CPE is set at 0 dBW (1Watt).

Question 5. Provide the geographic boundaries inside which it will operate its customer premises equipment transmitters in terms of latitude/longitude coordinates.

The table below provides the link budget for both the downlink (BTS to CPE) and uplink (CPE to BTS). As for most wireless systems, the coverage radius of this trial network is also limited by the uplink path, due to the lower CPE EIRP relative to that of the BTS. The radius also depends on the height of the CPE. Based on the link budget shown, the service radius for this experiment ranges from 1.1 km (assuming a CPE antenna height of 1.5 meters) to 2.1 km (assuming a CPE antenna height of 5 meters). The effective service area of the BTS is also determined by the BTS transmit/receive antenna's physical and electrical characteristics. As indicated in sections above, the BTS transmit and receive antennas have 60 degree beamwidth and will be pointed at 200 degree TN. The predicted coverage area is depicted in Figure 2.

Frequency band (MHz)	**1553**		
Forward Link Budget	**Units**		
BTS RF PA output	dBm	50	50
Tx Backoff (peak-to-average)	dB	10	10
Average BTS RF PA output	dBm	40	40
BTS antenna gain (dBi)	dBi	16	16
Incoherent power gain (4 antennas)	dB	0	0
BTS Cable loss	dB	1.5	1.5
BTS EIRP	dBm	**54.5**	**54.5**
MS antenna gain (dBi)	dBi	12.0	12.0
Coherent gain	dB	0	0
Channel bandwidth	MHz	4.375	4.375
FFT size		256.0	256.0
Active Subcarriers		200.0	200.0
Oversampling		5.00	5.00
Subcarrier spacing	Hz	19531.25	19531.25
MS noise figure	dB	4	4
Thermal noise	dBm/Hz	-174	-174
Modulation scheme		QPSK-1/2	QPSK-1/2
MS SNR requirement for QPSK 1/2	dB	5.5	5.5
Noise floor	dBm/Hz	-170	-170
Required instantaneous signal level	dBm	-98.1	-98.1
Log-Normal Fade Margin	dB	7.0	7.0
Rayleigh fade margin	dB	0.0	0.0
Penetration loss(in-building/in-car)	dB	0	0
Interference Margin	dB	0.0	0.0
Max path loss based on traffic EIRP	**dB**	**157.6**	**157.6**
Reverse Link Budget	**Units**		
MS average PA output	dBm	18.0	18.0
MS antenna gain (dBi)	dBi	12.0	12.0
MS EIRP	dBm	30.0	30.0
Coherent gain	dB	0.0	0.0
BTS cable loss	dB	1.5	1.5
BTS Receive antenna gain (dBi)	dBi	16	16
Number of subcarriers/subchannel		200	200
Subchannelization gain	dB	0.00	0.00
MRC (diversity) gain	dB	0	0
BTS SNR requirement for QPSK 1/2	dB	5.5	5.5
BTS noise figure	dB	4	4
Required signal strength	dBm	-98.1	-98.1
Log-Normal Fade Margin	dB	7.0	7.0
Rayleigh fade margin	dB	0.0	0.0
In-Building penetration loss	dB	0.0	0.0
Interference Margin	dB	0.0	0.0
Max path loss based on traffic EIRP	**dB**	**135.6**	**135.6**
CPE Antenna Height		**1.5 m**	**5 m**
Estimated Coverage Radius	**km**	**1.11**	**2.11**

Figure 2: Predicted Coverage Area



Question 6. Provide an analysis showing that the reverse-band operation is no more interfering than forward-band operation

The proposed experimental operations are neither "reverse-band" nor "forward-band," as those terms have been defined by the FCC.[2] Rather, the proposed experimental network is based on the WiMAX 802.16d standard and uses the Time Division Duplex (TDD) access scheme. With TDD, both the BTS and CPE transmit and receive in the same frequency band. For this proposed experiment, both the BTS and CPE will transmit and receive using the following frequencies in the 1.5 GHz MSS L band downlink: 1550.81-1555.19 MHz. The carrier frequency is 4.375MHz wide and centered at 1553.00 MHz. There will be no transmissions in the L band MSS uplink (1.6 GHz). Moreover, the BTS and CPE will operate in terrestrial mode only; there will be no satellite operations pursuant to this experiment.

The proposed experimental TDD network will cause no more interference than that permitted by the forward-band ATC network permitted by the FCC's rules. Pursuant to the FCC's rules, MSV is permitted to operate an unlimited number of L band ATC base stations in the 1.5 GHz band at a maximum EIRP of 31.9-10*log (number of carriers) dBW/200kHz, per sector, for each carrier.[3] Under the proposed experimental operation, MSV will operate a total of 11 transmitters in the 1.5 GHz band using its licensed frequencies at temporary fixed locations at an EIRP well below that permitted by the FCC's rules for ATC base stations. Moreover, the one BTS used for this experiment will transmit in one 60º sector only, thereby further limiting the potential for interference.

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[2] The FCC has explained that with "reverse band" operations, mobile terminals transmit in the downlink band and base stations transmit in the uplink band. With "forward band" operations, mobile terminals transmit in the uplink band and base stations transmit in the downlink band. *See Flexibility for Delivery of Communications by MSS Providers, Report and Order*, IB Docket No. 01-185, 18 FCC Rcd 1962 (February 10, 2003) ("*ATC Order*"), at Appendix C1 at § 1.0.

[3] *See* 47 C.F.R. § 25.253(d)(1); *see also Mobile Satellite Ventures Subsidiary LLC, Order and Authorization*, DA 04-3553 (Chief, International Bureau, November 8, 2004) ("*MSV ATC Decision*"), at ¶ 83.

Appendix 1: BTS PA Specifications

Aethercomm

2910 Norman Strasse Road, Suite 105
San Marcos, CA 92069
Phone – 760-598-4340
Fax – 760-598-4342

SSPA 1.5-1.7-100-RM
Compliance Matrix

Parameter	Performance	Comments
Frequency	1.5 to 1.7GHz	None
PSat	100 watts minimum, 125 watts typical	None
P1dB	80 watts minimum, 100 watts typical	None
Pin	24 nominal	Changed.
Gain	20dB min.	At minimum attenuation.
Gain Adjustment	10dB min.	A variable resistor will be mounted on front of 19" rack.
Small Gain Flatness	±1.0dB maximum	At minimum, insertion loss.
Input / Output VSWR	2.0:1 typical	None
Noise Figure	5dB maximum	At minimum attenuation.
Forward Sample Port	30 ±1.0dB	None
Spurious Signals	-60dB maximum	None
Power Consumption	800 watts maximum	None
Supply Voltage	240Vdc maximum	None
Relative Humidity	95% minimum	None
Amplifier On/Off	DC blanking 5000nSec max. On/Off time	External via DSub connecter on back of rack. CMOS High = PA On, CMOS Low/OC = PA Off
Reverse Polarity Protection	Standard	None
Over Voltage Protection	Standard	None
Under Voltage Lockout	Standard	None
Output Short and Open Circuit Protection	Standard	None
Volume	19" Rack Mount Unit 3 u high	Outline Drawing to be provided before fabrication.
Weight	25lbs maximum	None
Temperature Operating	50C	Base Plate temperature.
Temperature Non-Operating	-40 to 85C	Base Plate temperature.
Input Connector	SMA Female	Located on Front Panel.
Output Connector	Type N Female	Located on Front Panel.
Markings	TBD	None

Appendix 2: BTS Filter Specifications

RFMORECOM. Corea	Specification	Item	REV
		BPF	01

1. Part No :RMC1553B4.4M01

1-1. FEATURES

- High Performance
- High Reliability
- Cavity Type
- 1553MHz Band DR Cavity BPF

1-2. Electrical Specifications

ITEM	Specification	Remark
1-1.Operating frequency range	1550.8MHz to 1555.2MHz	
1-2.Operating bandwidth	4.4MHz	
1-3.Passband insertion loss	1.8dB Typ.(2.0dB Max)	
1-4.Passband ripple	1.2dB Max(1.0dB Typ.)	
1-5.Passband return loss	18dB Min	
1-6.Stopband Attenuation	60dB Min @ 1559MHz 25dB Min @ 1550MHz	
1-7.Group Delay	520nS Max	
1-7.Peak Power Input	100 W	
1-8.Average Power Input	10 W	

1-3. Environmental Specifications

ITEM	Specification	Remark
1-1.Operating temperature	-20℃ to +70℃	

RF Morecom.Corea. 102-704, SK Ventium, 522, Dangjeong-Dong, Gunpo-Si, Gyeunggi-Do, Korea
Tel : +82-31-455-3823, , Fax : +82-31-455-3833

RFM-001(Rev.001)

RFMORECOM. Corea	Specification	Item	REV
		BPF	01

2) S/N : 06030002